Bacteria → Gm- → Coccus → Neisseria

* Eikenella – E. corrodens – normal of URT | Opportunistic pathogen, usually after fistfight
* Kingella – K. kingae – normal of URT | Can disseminate → arthritis or endocarditis
* Neisseria (2 human-specific)
  + Aerobic | Non-motile | Gm- | Oxidase + | Catalase +
  + Virulence factors
    - Pili – Bring bacteria close to host cell | Have phase variation and antigenic variation
    - Opa – Mediate tight adherence + invasion of host | Multiple alleles to bind to R types
    - LOS (Lipooligosaccharide) – Similar to LPS but without O-Ag polysaccharide
    - IgA protease
    - Several mechanisms to evade complement
    - Peptidoglycan fragments
    - Porin proteins
    - Iron acquisition Proteins – No siderophorins | Have R that bind directly to host Fe molecules
  + **N. gonorrhoeae**
    - Clinical Implications
      * Major cause of urogenital disease (2nd highest in US)
      * Often symptomatic, esp in women
      * If untreated → severe reproductive complications
        + Pelvic Inflammatory Disease

Infection of fallopian tube → severe salpingitis, adhesions, scarring

→ Major cause of sterility + ectopic pregnancy

Results in adverse children effects → blindness, jt. infection, septicemia

* + - Epidemiology
      * Incidence dropped with use of barrier contraception
      * Risk groups: Young age | Southwestern US | African-American | Inconsistent barrier use
      * Incidence same in both sexes, men just have higher reporting
      * → Concern is about the new Antibiotic R strains
    - Pathophysiology – Transmitted during vaginal/anal sex
      * Infects single-cell columnar epithelial layers
      * Invade, transcytose, establish infection, kill epithelial cell
        + Can become asymptomatic if untreated
        + Can become subclinical, esp in females → deadly during childbirth
      * May ascend into fallopian tube → PID
    - Gonococcemia ← usually from untreated asymptomatic infection that disseminates thru blood
      * Skin lesions (75%) – Usually on extremities + trunk
      * Polyarthralgia (arthritis in multiple joints) – many have complement deficiencies
      * D: Gm stain | Culture on chocolate agar | Urine test | PCR test
      * T: DOC – 3rd gen Cephalosporin with Doxy (2x for 7days) or Azi (1 dose)
        + Need to be wary of Antibiotic R
  + **N. meningitides**
    - Most cases are meningitis b/w 0.5-2 yrs age | seasonal
    - With treatment – 10-15% die | Survivors – 20% have sequelae
    - Epidemiology
      * Common in sub-Saharan African countries
      * Transmitted by aerosol or via close contact
      * Risk groups: Young age | Crowded area | Complement Def. | Recent URTI | Smoking
        + Asymptomatic carriage is common | Once disseminated, can easily cross BBB
    - T: WHO had a reactive immunization strategy
      * Gates foundation donated $70 million to a more preventive vaccine | No implemented
    - Virulence Factor
      * Capsule – most important unique aspect at 13 serotypes
        + R to uptake + clearance | Has invasive properties
        + Type B is identical to ones produced in humans → cannot be treated
    - Clinical Implications
      * Abrupt (incubation 3-4 days)
      * Meningitis
        + Fever | H/A | Vomitting | Neck Stiffness | Altered Mental Status
        + If untreated → 100% die
      * Meningococcal Fulminant Sepsis
        + Septicemia | Septic Shock with small skin petechial lesions | Purpuric rash
        + Fatality at 18-53%
    - D: Isolated N meningitis from sterile site
      * Agglutination | PCR → Determine capsular serotype (for reporting purposes)
    - T: Vaccine
      * Meromune
        + 4 Capsular polysaccharides with NO side effects
        + Poorly effective in children because not conjugated
        + No serotype B
        + Only appropriate for risk groups
      * Menactra
        + Same 4 serotypes with NO side effects
        + More durable response because conjugated
        + Preferrred vaccine + treatment
        + Routine at 11 and 12 yrs with booster at 16 yrs

Bacteria → Gm- → Coccus → Moraxella

* **Moraxella catarrhalis**
  + Gm- | human-only | Oxidase + | Opportunistic
  + Clinical IMplciations
    - 15-20% - Otitis Media in US
    - 30% of bacterial exacerbations in COPD patients
  + T: No vaccine | Antibiotic R strains are emerging